REMARKS

Claims 1-17 are pending in the present application. In the Final Office Action mailed August 24, 2005, the Examiner rejected claims 1, 2, 5, and 6 under 35 U.S.C. §102(e) as being anticipated by Ishihara et al. (USP 5,916,161). Applicant appreciates the allowability of claims 7-17.

Applicant hereby requests reconsideration of the rejection of claims 1, 2, 5, and 6. In response to the traversal remarks presented June 6, 2005, the Examiner, in the Response to Amendment Arguments" section of the August 24, 2005 Office Action, asserted that the art of record teaches a system that can "variously reduce pulse power and lengthen application span or lengthen the interpulse interval all of which represents a dynamic tailoring of applied power" because "Ishihara et al makes it clear that dynamic power limits are imposed during re-examination after halting since in effect the thermal controller now has a past temperature pattern or reference..." OFFICE ACTION, Aug. 24, 2005, p. 3.

As presented in the remarks of June 6, 2005, Applicant does not dispute that the art of record teaches dynamic control of a pulse sequence based on measured temperature data; however, Ishihara et al. is clear that such dynamic control is achieved through altering of the RF pulses of a pulse sequence – not the gradient pulses. The reference discloses that "as for the manner of changing the pulse sequence, the first things to do is to suppress the pulse power and to increase the pulse application time span." ISHIHARA ET AL., col. 16, ll. 35-37. Taken in a vacuum, it would appear that the above statement could apply to gradient pulses; however, Ishihara et al. next discloses that "it is also possible to reduce a number of RF pulses to be applied, or to widen the RF pulse application interval." ISHIHARA ET AL., col. 16, ll. 37-29. The reference then teaches that "in a case of changing the RF pulse power, etc., automatically, it is necessary that an operator enters the current RF pulse input power (input voltage), application interval, application period, and pulse waveform, or these factors are measured automatically, or else these factors are read out from a file storing these factors in advance." ISHIHARA ET AL., col. 16, ll. 55-60. It is therefore clear that the reference teaches adjustment of the RF pulses of a pulse sequence.

In fact, to conclude that the RF pulses are not adjusted is to ignore the very problem that the technique of Ishihara et al. is designed to address. In the Background of the Invention section of the reference, Ishihara et al. goes to great length to expound upon the effects of the application of RF power onto a living body. Specifically, Ishihara et al. states "when many RF magnetic fields are applied according to this imaging method, a temperature inside a living body increases

due to the induced heating phenomenon." ISHIHARA ET AL., col. 1, ll, 20-23. The reference then describes the history of the U.S. Food and Drug Administration implementation of safety standards for MRI studies in 1982. Specifically, the reference discloses that the FDA recommended "to limit an application of RF power onto a living body according to the specific absorption rate (SAR)." ISHIHARA ET AL., col. 1, ll. 28-29. As a result, guidelines were established that not only defined SAR limits, but also body temperature limits. See ISHIHARA ET AL., col. 1, ll. 29-40. Ishihara et al., however, recognized a problem with then-conventional MR scans because "after the RF power is determined according to the SAR prior to the pulse sequence execution, the pulse sequence is executed regardless of a heat generation state of a body to be examined so that it has been impossible to confirm the safety of a body to be examined." ISHIHARA ET AL., col. 1, ll. 41-45. Accordingly, Ishihara et al. developed a technique to take the heat generation of the body into consideration and, in this regard, stated that "it is therefore an object of the present invention to provide a magnetic resonance imaging apparatus capable of measuring a temperature increase due to an application of RF magnetic fields for data acquisition purpose..." ISHIHARA ET AL., col. 1, l. 66 - col. 2, l. 2. As such, the reference's teaching of pulse sequence adjustment is clearly directed to adjustments of the RF pulses of the pulse sequence, not the gradient pulses.

In contrast, claim 1 is directed to a thermal control system that has "a thermal controller adapted to set at least one dynamic limit on a power input into at least one gradient coil of the MRI, said at least one dynamic limit being a function of the initial bore condition and the thermal boundary condition." In other words, the thermal controller is configured to dynamically and smartly set a limit on the power that can be applied to a gradient coil of an MRI apparatus – not the RF coils of an MRI apparatus. One skilled in the art will appreciate that a gradient coil is a wire conductor that is used to produce a linear magnetic field, i.e., gradient magnetic field, that is superimposed on the main magnetic field. Thus, the gradient pulse, indicative of the driving of the gradient coil, is not the same as the RF pulse referenced by Ishihara et al. The "pulse power" referenced by Ishihara et al. is directed to the amount of RF energy that is deposited within the imaging volume. Gradient pulse power, on the other hand, is indicative of the strength of the gradient magnetic field that is superimposed on the main magnetic field. Accordingly, contrary to the conclusion of the Examiner, Ishihara et al. fails to teach or suggest a thermal controller that sets a dynamic limit on the power input to a gradient coil of an MR system that is a function of an initial bore temperature and a thermal boundary condition, as called for in claim 1. Therefore, it

is believed that claims 1-2 and 5-6 call for subject matter that is patentably distinct from that disclosed by Ishihara et al.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-17.

Applicant appreciates the Examiner's consideration of these Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

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